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## ATTEMPTS TO REPRODUCE THE PYAEMIA ASSOCIATED WITH TICK-BITE

### Part I.—The Nature of the Infections Produced.

### Part II.—Comparison of the Blood Picture of the Different Infections.


A. WILSON TAYLOR, H. H. HOLMAN and W. S. GORDON

FROM THE ANIMAL DISEASES RESEARCH ASSOCIATION, MOREDUN INSTITUTE, GILMERTON, MIDLOTHIAN


On many of the tick-infested farms of Scotland and Northern England there occurs amongst lambs an illness characterised by debility, crippling lameness and in some cases paralysis, during the months of April and May each year. This is a period when ticks are very active and lambs become heavily infested with these parasites. As a result of this infestation the majority of lambs become infected with tick-borne fever and many also develop louping-ill. In addition to these two diseases it is common to find many lambs affected with abscesses at the site of tick-bites and in many cases a pyaemia develops resulting in the formation of abscesses in joints, muscles, tendon sheaths and even on the meninges of the brain and spinal cord. In the liver, kidney, spleen, lung and heart wall multiple abscess formation is also common. In the course of the routine examination of dead lambs received at this Institute, and also in extensive examination of lambs in the field, it has been found that under the flockmasters' diagnosis of "louping-ill" is included a number of diseases among which are those clinical conditions which result from infection with any combination of the tick-borne diseases and pyaemia. This pyaemic condition is that described by M'Fadyean (1894) and again by Stewart and Ponsford (1937). Both authors refer to the isolation of a slightly chromogenic Gram-positive micrococcus from the abscesses, and our own experience has been that an organism morphologically and culturally resembling *Staphylococcus aureus* can be isolated both from superficial and deeply seated abscesses. This pyaemia appears to be associated with tick-bite, because it occurs only in epizoötic form on tick-infested pastures and because the superficial abscesses, which contain the same organism as the deep abscesses, develop at the site of tick-bite. It has not been determined whether the ticks have a specific rôle in the perpetuation and spread of the staphylococcus or whether their part is merely that of mechanically assisting infection of the superficial tissues with a staphylococcus present on the surface of the skin of the lambs. Present evidence indicates, however, that the disease is specific in that it is rare to find any organism other than *Staphylococcus aureus* in the abscesses but, as might be expected, inoculation of lambs with this organism while it produces a local abscess fails to cause a pyaemic infection. There is therefore reason to suspect that, in some manner, infestation with ticks provides a factor favourable to the development of a pyaemia following superficial abscess formation resulting from infection with *Staphylococcus aureus*, and it was considered advisable to determine if the debilitating effect of louping-ill, with or without the association of tick-borne fever, which commonly accompanies this condition, might provide the necessary factor.

It is the purpose of this paper to record the result of a preliminary attempt to reproduce a generalised pyaemic infection of lambs by superimposing a staphylococcal infection on an already existing infection with louping-ill, tick-borne fever or a combination of these two diseases. Although the experiments failed in their primary object, they provided an opportunity of making a comparison of the blood changes resulting from different types of infection. The paper is presented in two parts. Part I deals with the nature of the infections produced and Part II with the blood changes which occurred in the different infections.

## *Part I.—The Nature of the Infections Produced*

### EVIDENCE REGARDING THE INCIDENCE OF PYAEMIA

Evidence regarding the incidence of pyaemia in lambs as it occurs on tick-infested farms has been provided by M'Fadyean (1894), who estimated that approximately half of the lambs submitted to him as being affected with louping-ill were actually infected with pyaemia. Stewart and Ponsford (1937) record that "of 209 lambs examined after death on tick-infested pasture pyaemic infections were noted in 100 cases, and in all probability were the cause of death in 80 cases." In 1939 we examined 69 lambs from a group of tick-infested farms and found that 20, or

29 per cent., were affected with pyaemia, while in 1940, of 193 lambs obtained from the same group of farms, 57, or 29 per cent., were affected with pyaemia. There is therefore evidence of a high incidence of pyaemic infection in the lambs on tick-infested farms and on clinical grounds alone it is obvious that the abscesses resulting from this infection are the cause of much debility and crippling lameness in infected lambs. It is not yet clear, however, to what extent this infection *per se* can be regarded as responsible for death since the condition is so often complicated by the presence of other lamb diseases which are prevalent in the spring. Thus, although Stewart and Ponsford found a pyaemic infection in 100 lambs, they suggested that this infection was probably only responsible for death in 80, while the remaining 20 died of infection with *Cl. welchii* type D. Their methods of examination were adequate for the detection of an infection with *Cl. welchii*, and wherever this infection was found then pyaemia was regarded as of secondary importance in the cause of death. It is possible also that had it been practicable for them to carry out examinations adequate for the diagnosis of louping-ill and tick-borne fever in all the lambs they examined, many, if not all, would have been found to be affected with tick-borne fever and possibly some with louping-ill. This view is expressed because in the course of the examination of lambs believed to have died of pyaemia we have frequently extended the investigation to include examination for the presence of louping-ill and tick-borne fever, and on numerous occasions have found that these infections may co-exist with pyaemia. In this connection it should be noted that a negative diagnosis of tick-borne fever infection can be accepted only if blood from the animal under test fails to produce infection in a normal sheep. Similarly, in the case of louping-ill infection many animals die as a result of atypical infections in which the specific virus may be detected in the blood or spleen only and not in the central nervous system, and cases have also been encountered in which the virus was not detected in the tissues although definite lesions of encephalomyelitis have been observed in the brain and spinal cord. It is therefore becoming increasingly obvious that in the control of so-called louping-ill in lambs it is not only necessary to block infection with the virus of louping-ill but consideration will have to be given also to the control of pyaemia, tick-borne fever and infections with *Cl. welchii* since the mortality which results from any one or any combination of these infections on a tick-infested farm may be regarded by the flockmaster as resulting from louping-ill.

## Material and Methods Employed for Producing Infection

The animals employed in this experiment were 21 Cheviot lambs, approximately four months' old. The various types of infection were produced by subcutaneous injection inside the thigh, and the infective material used was obtained from the following sources :

*Tick-borne Fever.*—Infective blood, collected in 3 per cent. potassium citrate, was obtained from a sheep infected with tick-borne fever. The strain was one which had been maintained at the Institute by passage through sheep in series. The dose employed was 15 c.c.

*Louping-ill* infective material consisted of a 1 per cent. suspension in saline of the dried brain obtained from a sheep infected with louping-ill. The dose employed was 5.0 c.c.

*Staphylococcus aureus.*—The strain used was one isolated from an abscess in a naturally occurring case of pyaemia. It had been subcultivated three times and was grown on plain agar. The growth was washed off the agar with normal saline and its opacity standardised to match No. 2 on Brown's scale. The dose employed was 1 c.c.

The experimental animals were divided into seven groups, each of three individuals, and inoculated on the dates shown in Table I. Thus,

Group 1 received *Staphylococcus aureus*,
Group 2 tick-borne fever,
Group 3 louping-ill,
Group 4 tick-borne fever, and two days later, louping-ill,
Group 5 tick-borne fever, and four days later, *Staph. aureus*,
Group 6 louping-ill, and two days later, *Staph. aureus*,
Group 7 tick-borne fever followed two days later by louping-ill, and after a further two days, by *Staph. aureus*.

## Procedure After Infection

The temperature of each animal in the experiment was recorded daily from August 3rd to August 28th.

From August 8th to August 17th a blood sample from every surviving animal was obtained from the jugular vein and utilised in the following ways :—

(*a*) Inoculated into glucose broth and incubated at 37° C. for the purpose of detecting infection of the blood with staphylococci.

(*b*) Inoculated intracerebrally into mice for the detection of the virus of louping-ill.

(*c*) For the preparation of blood films which were examined for the presence of the infective agent of tick-borne fever and for staphylococci.

(*d*) Used in the haematological investigation described in Part II of this paper.

At autopsy, cultures were made from the liver and heart blood in every instance. In the case of lambs infected with staphylococci agar slopes were inoculated with material obtained from the site of inoculation and from any lesion which might have harboured staphylococci. The cultures obtained were accepted as *Staphylococcus aureus* if they produced haemolysis on sheep blood agar, liquefied gelatin and formed a golden yellow pigment on Loeffler's serum at 22° C. Following the death or destruction of lambs infected with louping-ill, sections of the medulla oblongata were examined for lesions of encephalitis and mice were inoculated intracerebrally with a 1 per cent. suspension of brain tissue in saline.

## Results

The results of the experiment have been summarised and are presented in Table I, from which it will be seen that with the exception of lamb 116 the control lambs, namely, Groups 2, 3 and 4, which were infected respectively with tick-borne fever, louping-ill and these two diseases combined, all reacted satisfactorily. The inoculation of *Staphylococcus aureus* was followed, except in Group 7, by the development of a local abscess which in the majority of cases matured and showed no tendency

TABLE I

| Group. | No. | Inoculations. | | | Clinical findings. | | | Blood samples. | | | Date of death. | Autopsy. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Cultures. | | Pyaemic lesions. | L.I.L. |
| | | T.B.F. | L.I. | S.A. | Temp. exceeded 103° F. | Local lesion. | L.I.S. | T.B.F. | Culture. | L.I.V. | | Liver and H. blood. | Local lesions. | | |
| 1 | 110 | — | — | 7.8.39 | 8.8.39 | + | — | — | — | — | K. 11.9.39 | N.G. | N.G. | — | — |
| | 111 | — | — | 7.8.39 | 8.8.39 | + | — | — | — | — | K. 11.9.39 | N.G. | N.G. | — | — |
| | 112 | — | — | 7.8.39 | 8.8.39 | + | — | — | — | — | K. 11.9.39 | N.G. | N.G. | — | — |
| 2 | 113 | 3.8.39 | — | — | 6.8.39 | — | — | + | — | — | K. 11.9.39 | N.G. | N.G. | — | — |
| | 114 | 3.8.39 | — | — | 6.8.39 | — | — | + | — | — | — | — | — | — | — |
| | 115 | 3.8.39 | — | — | 6.8.39 | — | — | + | — | — | — | — | — | — | — |
| 3 | 116 | — | 5.8.39 | — | — | — | — | — | — | — | K. 11.9.39 | N.G. | — | — | — |
| | 117 | — | 5.8.39 | — | 15.8.39 | — | — | — | — | + | — | — | — | — | — |
| | 118 | — | 5.8.39 | — | 14.8.39 | — | — | — | — | + | — | — | — | — | — |
| 4 | 119 | 3.8.39 | 5.8.39 | — | 7.8.39 | — | + | + | — | + | K. 14.8.39 | N.G. | — | — | + |
| | 120 | 3.8.39 | 5.8.39 | — | 7.8.39 | — | + | + | — | + | D. 16.8.39 | N.G. | — | — | + |
| | 121 | 3.8.39 | 5.8.39 | — | 7.8.39 | — | — | + | — | + | K. 11.9.39 | N.G. | — | — | — |
| 5 | 122 | 3.8.39 | — | 7.8.39 | 6.8.39 | + | — | + | — | — | K. 11.9.39 | N.G. | S.A. | — | — |
| | 123 | 3.8.39 | — | 7.8.39 | 6.8.39 | + | — | + | — | — | K. 11.9.39 | N.G. | S.A. | — | — |
| | 124 | 3.8.39 | — | 7.8.39 | 6.8.39 | + | — | + | — | — | K. 11.9.39 | N.G. | S.A. | — | — |
| 6 | 125 | — | 5.8.39 | 7.8.39 | 8.8.39 | + | — | — | — | + | K. 11.9.39 | N.G. | S.A. | — | — |
| | 126 | — | 5.8.39 | 7.8.39 | 8.8.39 | + | — | — | — | + | K. 11.9.39 | N.G. | N.G. | — | — |
| | 127 | — | 5.8.39 | 7.8.39 | 8.8.39 | + | — | — | — | + | K. 11.9.39 | N.G. | S.A. | — | — |
| 7 | 128 | 3.8.39 | 5.8.39 | 7.8.39 | 6.8.39 | + | + | + | — | + | D. 15.8.39 | N.G. | S.A. | — | + |
| | 129 | 3.8.39 | 5.8.39 | 7.8.39 | 6.8.39 | + | + | + | — | + | D. 14.8.39 | N.G. | S.A. | — | + |
| | 130 | 3.8.39 | 5.8.39 | 7.8.39 | 6.8.39 | + | + | + | — | + | D. 12.8.39 | N.G. | S.A. | — | + |

T.B.F. = Tick-borne fever; L.I., L.I.S., L.I.V., L.I.L. = Louping-ill, — symptoms, — virus, — lesions; S.A. = *Staph. aureus*; D. = Died; K. = Killed; N.G. = No growth; + = Present.

to spread or to give rise to a generalised infection or serious constitutional disturbance. The lambs in Group 7, which received all three inocula, developed an extensive swelling which spread from the site of inoculation downwards to the hock joint and upwards along the abdominal wall to the umbilicus. At death the swelling was found to be due to a haemorrhagic oedema with marked thickening and necrosis of the subcutaneous tissue. The death of these animals apparently from louping-ill was probably accelerated by toxaemia.

## DISCUSSION

In naturally occurring cases of pyaemia in lambs the widespread distribution of the lesions throughout the body is suggestive of infection by an organism possessing marked invasive characters, yet cultures of this organism when inoculated into lambs fail to show this invasive property. Among the reasons which could be put forward to explain this difference might be included the loss of invasive character as a result of cultivation outside the body, the presence of a factor associated with tick-bite which favours generalisation of a local infection, or a generalised infection might ensue because of a lowering of host resistance resulting from infection with tick-borne fever and/or louping-ill. This last possibility is that examined by the work described in this paper and within the limited scope of the experiment it has been shown that a pyaemic infection failed to develop when *Staphylococcus aureus* was inoculated subcutaneously into normal lambs and into lambs infected with louping-ill and tick-borne fever. The effect of variation either in the dose of organisms employed or in the route of infection was not included in the investigation.

Comparison of the mortality which occurred in Groups 3, 4 and 7 shows that none of the three animals in Group 3, which were infected with louping-ill virus only, developed a fatal infection, whereas of the six animals in Groups 4 and 7, which were infected both with louping-ill and tick-borne fever, five died or had to be destroyed as a result of invasion of the brain and spinal cord with the virus of louping-ill. This confirms the observations of Gordon *et al.* (1932) and MacLeod and Gordon (1932) that tick-borne fever aggravates the harmful effects of a louping-ill infection.


### Summary

Subcutaneous inoculation of lambs with *Staphylococcus aureus* freshly isolated from a natural case of pyaemia resulted in the formation of an abscess at the site of inoculation. This local infection showed no tendency to become a generalised infection either in normal lambs or in lambs infected with louping-ill and/or tick-borne fever.

## *Part II.—Comparison of the Blood Picture of the Different Infections.*

Advantage was taken of the foregoing experiment to compare the blood pictures in sheep resulting from three types of noxae: (*a*) a bacterial organism, *Staphylococcus aureus*; (*b*) a virus, namely, the virus of louping-ill; (*c*) a rickettsia-like organism, the cause of tick-borne fever. It was considered possible that this comparison might be of value with regard to the differential diagnosis of these infections.

The experiment involved the recording of the total and differential leucocyte counts and the estimation of the haemoglobin.

### Technique

Leucocytic counts were carried out according to the technique described by Schilling (1929), except that the lymphocytes were further classified into two groups, large lymphocytes and small or medium lymphocytes. The cells classified as large lymphocytes were cells of lymphocytic morphology but were equal to monocytes in size. This classification, therefore, was to some degree, subject to the personal factor.

The haemoglobin estimation was carried out by the use of a Zeiss Ikon haemometer, graduated in g. per 100 c.c. for human blood.

Observations were made at two-day intervals, the first observation being carried out a few minutes before the injection of the first noxa. The inocula and the methods of inoculation have been described in Part I of this paper.

The groups kept under observation for the purpose of determining the blood picture are tabulated below.

| Group. | Sheep Nos. | Date of Injection. | | |
|---|---|---|---|---|
| | | Aug. 3rd. | Aug. 5th. | Aug. 7th. |
| 1 | 110, 111, 112 | | | Staph. |
| 2 | 113, 114, 115 | T.B.F. | | |
| 3 | 116, 117, 118 | | L.I. | |
| 5 | 122, 123, 124 | T.B.F. | | Staph. |
| 6 | 125, 126, 127 | | L.I. | Staph. |

### Results

These are represented diagrammatically in Figs. 1, 2 and 3 and the records for individual sheep are given in Table II.

*Staphylococcal Infection* (Fig. 1).—Counts carried out two days after inoculation showed a definite absolute neutrophilia in each sheep. This occurred even when infection with louping-ill or tick-borne fever was already existent. This primary neutrophilia quickly regressed, and was followed about a fortnight later by a less transient neutrophilia, presumably connected with the process of recovery.

The lymphocytes showed a slight, but persistent decrease commencing four days after inoculation.

This decrease also occurred when the staphylococcal infection was secondary to either louping-ill or tick-borne fever. It might be presumed that this decrease in lymphocytes was followed at a later date by a " post-infective " lymphocytosis.

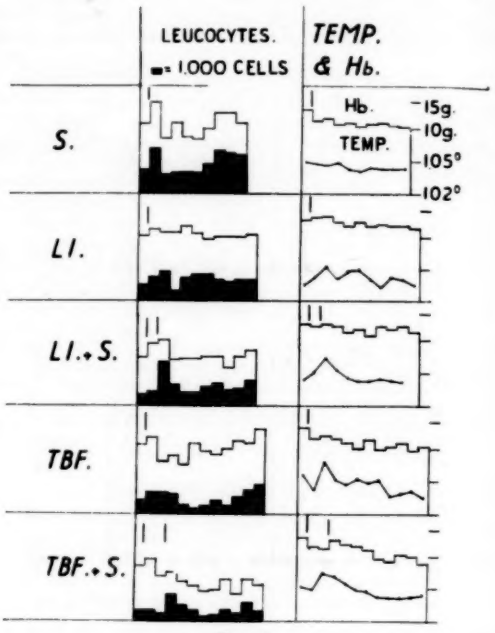


Fig. 1

Fig. 1.—Averaged readings taken at two-day intervals. Inoculation of noxae denoted by vertical lines, where two such lines are present the second line denotes the inoculation with *Staph. aureus*. *Leucocytes*: Upper line denotes average of the leucocytic counts, blacked-in area represents proportion of neutrophils present. *Temperatures*: The temperatures at two-day intervals are recorded as a curve. In the case of the sheep inoculated with *Staph. aureus* the only definite temperature reaction was present the day after inoculation and this has been indicated by a dot at the appropriate height.

Other changes occurring in these sheep are dealt with under the heading of " General Changes and Discussion."

*Louping-ill* (Fig. 1).—Following infection with louping-ill virus a slight neutrophilia was apparent on the second and fourth days after inoculation; on the sixth day, however, there was a decrease in numbers. This was followed by a second slight neutrophilia, and a return to normal. This neutrophilia following infection with louping-ill is apparently limited to the neurotropic viruses, the common finding with other viruses being a neutropenia (Whitby and Britton, 1937). In the case of sheep No. 116 that received an inoculation of live virus but did not show a febrile reaction (see Table I), the blood picture coincided with that of the other sheep of this group.

The lymphocytes in the case of louping-ill appear to play a passive part in the reaction, and alterations in their numbers do not appear to be significant.

*Tick-borne Fever* (Fig. 1).—The sheep infected with tick-borne fever alone showed a slight increase in neutrophil cells at the second and fourth day after inoculation. That such an increase does not always occur can be seen from the records of Group 5,

(*Text continued on page* 344.)

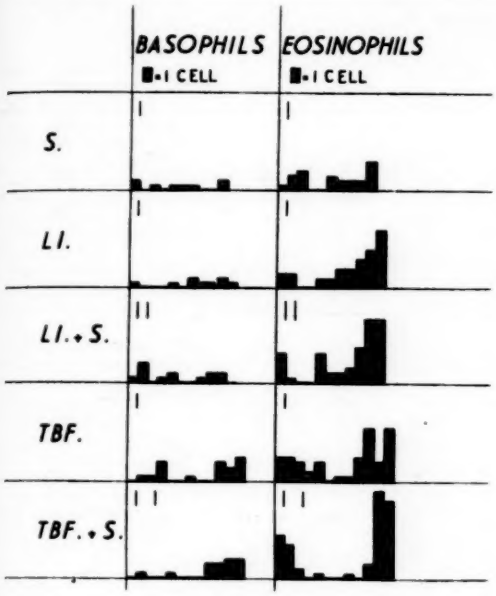


FIG. 2

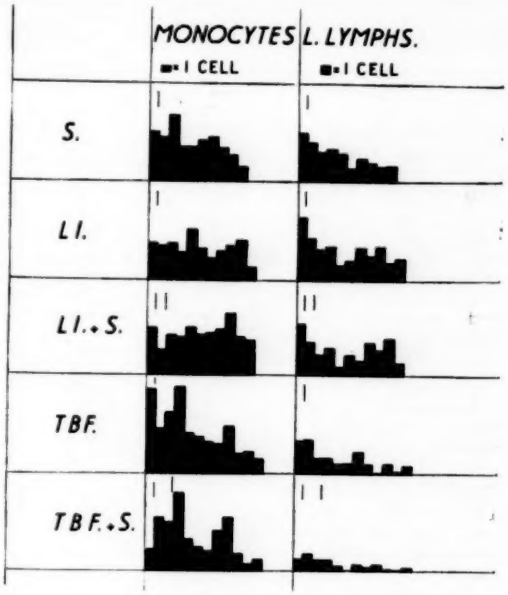


FIG. 3

FIGS. 2 and 3.—Averaged differential counts. Readings taken at two-day intervals. Inoculations of noxae denoted by vertical lines. Where two such lines are present the second denotes the inoculation of *Staph. aureus*.

TABLE II

STAPHYLOCOCCUS

| August. | 3 | 5 | 7 | 9 | 11 | 13 | 15 | 17 | 19 | 21 | 23 | 25 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sheep No.* 110 | | | | | | | | | | | | |
| White cells × $10^3$ | | | 9·5 | 18·1 | 8·8 | 13·0 | 9·8 | 8·0 | 7·8 | 7·4 | 11·4 | 17·6 |
| Bands ... ... | | | 2 | 1 | 2 | 0 | 0 | 0 | 0 | 1 | 0 | 4 |
| Polymorphs ... | | | 39 | 55 | 31 | 41 | 44 | 58 | 34 | 33 | 38 | 48 |
| Lymphocytes ... | | | 33 | 23 | 42 | 44 | 40 | 32 | 49 | 54 | 52 | 36 |
| Large lymphocytes | | | 18 | 15 | 12 | 11 | 12 | 2 | 11 | 5 | 5 | 5 |
| Monocytes ... | | | 7 | 5 | 10 | 4 | 3 | 4 | 4 | 6 | 4 | 1 |
| Eosinophils ... | | | 1 | 1 | 3 | 0 | 0 | 3 | 1 | 1 | 1 | 4 |
| Basophils ... | | | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 2 |
| Haemoglobin ... | | | 12·8 | 12·2 | 12·0 | 11·8 | 11·1 | 10·1 | 11·4 | 11·3 | 12·0 | 12·0 |
| *Sheep No.* 111 | | | | | | | | | | | | |
| White cells × $10^3$ | | | 14·8 | 16·8 | 9·6 | 9·2 | 9·4 | 9·5 | 10·1 | 19·3 | 19·0 | 7·9 |
| Bands ... ... | | | 3 | 13 | 7 | 10 | 13 | 2 | 1 | 0 | 0 | 0 |
| Polymorphs ... | | | 20 | 29 | 33 | 20 | 21 | 35 | 49 | 59 | 61 | 56 |
| Lymphocytes ... | | | 52 | 36 | 50 | 62 | 56 | 53 | 35 | 28 | 30 | 35 |
| Large lymphocytes | | | 17 | 17 | 5 | 5 | 4 | 5 | 6 | 8 | 6 | 7 |
| Monocytes ... | | | 7 | 4 | 5 | 3 | 6 | 5 | 8 | 4 | 3 | 2 |
| Eosinophils ... | | | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 |
| Basophils ... | | | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Haemoglobin ... | | | 12·7 | 9·2 | 10·6 | 9·8 | 10·0 | 9·4 | 8·8 | 9·6 | 8·7 | 8·4 |
| *Sheep No.* 112 | | | | | | | | | | | | |
| White cells × $10^3$ | | | 8·7 | 9·2 | 7·2 | 11·2 | 6·7 | 7·4 | 11·8 | 10·3 | 6·7 | 7·4 |
| Bands ... ... | | | 0 | 6 | 5 | 3 | 0 | 4 | 0 | 0 | 0 | 0 |
| Polymorphs ... | | | 38 | 37 | 29 | 10 | 37 | 25 | 55 | 58 | 50 | 58 |
| Lymphocytes ... | | | 41 | 39 | 39 | 63 | 45 | 53 | 28 | 32 | 40 | 32 |
| Large lymphocytes | | | 14 | 8 | 13 | 17 | 13 | 6 | 7 | 6 | 5 | 5 |
| Monocytes ... | | | 6 | 9 | 12 | 7 | 5 | 12 | 10 | 4 | 4 | 3 |
| Eosinophils ... | | | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 2 |
| Basophils ... | | | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Haemoglobin ... | | | 12·7 | 12·0 | 12·0 | 10·3 | 11·5 | 11·8 | 11·8 | 12·0 | 10·9 | 10·5 |

TABLE II—*continued*

LOUPING-ILL

| August. | 3 | 5 | 7 | 9 | 11 | 13 | 15 | 17 | 19 | 21 | 23 | 25 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sheep No.* 116 | | | | | | | | | | | | |
| White cells × $10^3$ | | 11·6 | 11·0 | 8·8 | 14·4 | 14·2 | 10·0 | 11·2 | 11·0 | 11·9 | 11·2 | 9·2 |
| Bands ... ... | | 4 | 6 | 3 | 0 | 0 | 1 | 0 | 3 | 1 | 0 | 0 |
| Polymorphs ... | | 14 | 22 | 40 | 13 | 23 | 31 | 34 | 32 | 40 | 34 | 30 |
| Lymphocytes ... | | 60 | 45 | 44 | 69 | 64 | 58 | 51 | 56 | 45 | 51 | 59 |
| Large lymphocytes | | 15 | 19 | 11 | 15 | 5 | 3 | 7 | 4 | 7 | 8 | 6 |
| Monocytes ... | | 6 | 7 | 2 | 3 | 8 | 6 | 5 | 3 | 3 | 1 | 1 |
| Eosinophils ... | | 1 | 1 | 0 | 0 | 0 | 1 | 2 | 2 | 3 | 6 | 4 |
| Basophils ... | | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 |
| Haemoglobin ... | | 12·0 | 13·0 | 13·4 | 12·7 | 11·9 | 13·3 | 12·4 | 11·7 | 12·7 | 12·3 | 12·0 |
| *Sheep No.* 117 | | | | | | | | | | | | |
| White cells × $10^3$ | | 9·0 | 12·6 | 13·6 | 8·2 | 11·4 | 11·2 | 10·0 | 9·9 | 10·9 | 8·6 | 10·4 |
| Bands ... ... | | 3 | 2 | 0 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 0 |
| Polymorphs ... | | 33 | 36 | 48 | 17 | 39 | 29 | 40 | 29 | 23 | 41 | 26 |
| Lymphocytes ... | | 29 | 50 | 42 | 73 | 47 | 61 | 47 | 60 | 51 | 47 | 54 |
| Large lymphocytes | | 28 | 6 | 4 | 4 | 3 | 4 | 10 | 2 | 14 | 4 | 12 |
| Monocytes ... | | 5 | 4 | 6 | 5 | 9 | 3 | 1 | 7 | 9 | 7 | 1 |
| Eosinophils ... | | 1 | 2 | 0 | 0 | 1 | 1 | 1 | 1 | 3 | 1 | 7 |
| Basophils ... | | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 |
| Haemoglobin ... | | 15·0 | 13·3 | 13·5 | 12·0 | 13·4 | 12·5 | 12·0 | 13·5 | 12·6 | 12·8 | 12·8 |
| *Sheep No.* 118 | | | | | | | | | | | | |
| White cells × $10^3$ | | 9·8 | 10·0 | 9·5 | 9·2 | 9·6 | 10·2 | 7·7 | 9·4 | 7·5 | 10·0 | 11·2 |
| Bands ... ... | | 3 | 3 | 0 | 0 | 2 | 0 | 0 | 1 | 0 | 0 | 1 |
| Polymorphs ... | | 24 | 30 | 35 | 16 | 32 | 52 | 56 | 37 | 25 | 28 | 37 |
| Lymphocytes ... | | 46 | 44 | 41 | 65 | 49 | 31 | 23 | 38 | 59 | 53 | 50 |
| Large lymphocytes | | 22 | 18 | 17 | 16 | 8 | 13 | 17 | 20 | 14 | 6 | 5 |
| Monocytes ... | | 4 | 5 | 7 | 3 | 8 | 4 | 3 | 2 | 2 | 8 | 3 |
| Eosinophils ... | | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 2 | 0 | 3 | 3 |
| Basophils ... | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 |
| Haemoglobin ... | | 11·2 | 12·5 | 11·6 | 12·1 | 9·8 | 10·9 | 10·6 | 10·4 | 10·0 | 9·8 | 9·5 |

TICK-BORNE FEVER

| August. | 3 | 5 | 7 | 9 | 11 | 13 | 15 | 17 | 19 | 21 | 23 | 25 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sheep No.* 113 | | | | | | | | | | | | |
| White cells × $10^3$ | 11·6 | 8·3 | 4·4 | 7·6 | 5·8 | 13·1 | 5·4 | 6·8 | 9·2 | 8·7 | 6·5 | 10·8 |
| Bands ... ... | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| Polymorphs ... | 23 | 30 | 39 | 33 | 26 | 5 | 10 | 24 | 2 | 25 | 37 | 42 |
| Lymphocytes ... | 52 | 46 | 44 | 51 | 65 | 88 | 69 | 71 | 84 | 70 | 52 | 41 |
| Large lymphocytes | 11 | 12 | 3 | 3 | 3 | 1 | 13 | 2 | 0 | 0 | 2 | 8 |
| Monocytes ... | 13 | 10 | 12 | 11 | 3 | 6 | 7 | 2 | 14 | 4 | 8 | 3 |
| Eosinophils ... | 1 | 2 | 2 | 1 | 3 | 0 | 1 | 1 | 0 | 1 | 0 | 4 |
| Basophils ... | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Haemoglobin ... | 13·0 | 11·5 | 12·4 | 11·6 | 10·4 | 10·2 | 11·9 | 10·4 | 9·6 | 11·0 | 9·7 | 9·8 |
| *Case No.* 114 | | | | | | | | | | | | |
| White cells × $10^3$ | 9·2 | 15·2 | 11·4 | 10·1 | 8·4 | 8·8 | 11·6 | 9·0 | 10·1 | 11·5 | 13·3 | 14·2 |
| Bands ... ... | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Polymorphs ... | 21 | 25 | 39 | 40 | 18 | 19 | 20 | 25 | 22 | 26 | 32 | 32 |
| Lymphocytes ... | 50 | 64 | 48 | 44 | 72 | 71 | 70 | 68 | 74 | 73 | 68 | 62 |
| Large lymphocytes | 14 | 4 | 7 | 7 | 5 | 4 | 6 | 2 | 1 | 0 | 0 | 0 |
| Monocytes ... | 15 | 4 | 5 | 5 | 4 | 6 | 3 | 5 | 3 | 0 | 0 | 0 |
| Eosinophils ... | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 6 |
| Basophils ... | 0 | 0 | 0 | 3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| Haemoglobin ... | 13·4 | 11·6 | 11·6 | 11·1 | 11·9 | 9·8 | 11·0 | 9·0 | 9·8 | 9·8 | 8·5 | 8·9 |
| *Sheep No.* 115 | | | | | | | | | | | | |
| White cells × $10^3$ | 11·0 | 12·1 | 8·8 | 9·2 | 8·8 | 11·4 | 8·4 | 9·6 | 12·1 | 15·1 | 13·3 | 14·3 |
| Bands ... ... | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Polymorphs ... | 16 | 30 | 41 | 25 | 10 | 10 | 6 | 26 | 16 | 20 | 31 | 30 |
| Lymphocytes ... | 65 | 45 | 43 | 52 | 79 | 82 | 88 | 63 | 77 | 53 | 61 | 61 |
| Large lymphocytes | 8 | 18 | 6 | 6 | 1 | 5 | 3 | 6 | 0 | 10 | 0 | 0 |
| Monocytes ... | 6 | 4 | 8 | 17 | 1 | 3 | 3 | 5 | 2 | 4 | 1 | 3 |
| Eosinophils ... | 4 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 5 | 9 | 4 | 1 |
| Basophils ... | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 2 | 5 |
| Haemoglobin ... | 13·4 | 11·6 | 12·3 | 12·2 | 10·6 | 10·6 | 11·7 | 10·6 | 11·5 | 12·0 | 11·0 | 12·0 |

TABLE II—*continued*

STAPHYLOCOCCUS. TICK-BORNE FEVER

| August. | 3 | 5 | 7 | 9 | 11 | 13 | 15 | 17 | 19 | 21 | 23 | 25 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sheep No.* 122 | | | | | | | | | | | | |
| White cells × $10^3$ | 8·6 | 4·8 | 4·8 | 7·2 | 5·2 | 4·4 | 5·2 | 5·2 | 6·6 | 3·6 | 5·5 | 5·6 |
| Bands ... ... | 0 | *4 | 0 | 3 | 1 | 0 | 0 | 0 | 0 | 2 | 0 | 1 |
| Polymorphs ... | 25 | 13 | 21 | 52 | 49 | 60 | 15 | 31 | 31 | 24 | 29 | 12 |
| Lymphocytes ... | 70 | 64 | 71 | 28 | 43 | 38 | 79 | 62 | 47 | 65 | 57 | 66 |
| Large lymphocytes | 1 | 8 | 4 | 4 | 3 | 0 | 5 | 3 | 5 | 1 | 0 | 3 |
| Monocytes ... | 1 | 9 | 3 | 13 | 3 | 2 | 1 | 3 | 14 | 3 | 1 | 1 |
| Eosinophils ... | 3 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 3 | 12 | 14 |
| Basophils ... | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 3 | 2 | 1 | 3 |
| Haemoglobin ... | 13·0 | 11·8 | 10·9 | 13·0 | 12·6 | 12·5 | 13·7 | 11·8 | 10·2 | 11·9 | 12·5 | 11·8 |
| *Sheep No.* 123 | | | | | | | | | | | | |
| White cells × $10^3$ | 8·8 | 12·8 | 10·1 | 9·0 | 8·0 | 7·4 | 2·4 | 4·8 | 7·2 | 5·3 | 7·8 | 5·5 |
| Bands ... ... | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| Polymorphs ... | 24 | 11 | 15 | 61 | 45 | 12 | 16 | 6 | 9 | 25 | 31 | 27 |
| Lymphocytes ... | 64 | 69 | 67 | 23 | 45 | 81 | 79 | 90 | 82 | 70 | 61 | 69 |
| Large lymphocytes | 6 | 7 | 7 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 |
| Monocytes ... | 2 | 8 | 10 | 15 | 5 | 6 | 4 | 4 | 8 | 3 | 1 | 2 |
| Eosinophils ... | 4 | 5 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 4 | 1 |
| Basophils ... | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 1 |
| Haemoglobin ... | 13·5 | 11·8 | 11·4 | 12·7 | 11·0 | 11·3 | 12·0 | 12·4 | 13·1 | 12·9 | 12·9 | 10·4 |
| *Sheep No.* 124 | | | | | | | | | | | | |
| White cells × $10^3$ | 8·4 | 10·4 | 5·8 | 7·0 | 5·4 | 4·8 | 6·5 | 4·5 | 5·5 | 3·6 | 5·9 | 6·0 |
| Bands ... ... | 1 | 0 | 2 | 0 | 2 | 0 | 0 | 1 | 25 | 29 | *17 | 7 |
| Polymorphs ... | 13 | 28 | 17 | 38 | 20 | 24 | 15 | 31 | 11 | 4 | 29 | 31 |
| Lymphocytes ... | 73 | 62 | 74 | 52 | 72 | 74 | 82 | 57 | 64 | 65 | 50 | 59 |
| Large lymphocytes | 5 | 3 | 0 | 6 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 |
| Monocytes ... | 6 | 5 | 7 | 4 | 5 | 2 | 3 | 10 | 0 | 1 | 1 | 2 |
| Eosinophils ... | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 |
| Basophils ... | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Haemoglobin ... | 12·5 | 11·3 | 11·8 | 12·6 | 12·1 | 11·0 | 7·4 | 5·0 | 5·0 | 6·0 | 4·5 | 4·3 |

* = One young form

STAPHYLOCOCCUS. LOUPING-ILL

| August. | 3 | 5 | 7 | 9 | 11 | 13 | 15 | 17 | 19 | 21 | 23 | 25 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sheep No.* 125 | | | | | | | | | | | | |
| White cells × $10^3$ | | 4·4 | 8·4 | 6·0 | 6·6 | 6·8 | 7·2 | 6·1 | 7·1 | 4·9 | 5·9 | 10·4 |
| Bands ... ... | | 3 | 1 | 3 | 10 | 0 | 0 | 0 | 3 | 0 | 0 | 0 |
| Polymorphs ... | | 20 | 26 | 53 | 27 | 26 | 32 | 39 | 27 | 26 | 33 | 63 |
| Lymphocytes ... | | 49 | 54 | 32 | 45 | 58 | 55 | 52 | 42 | 50 | 37 | 29 |
| Large lymphocytes | | 21 | 11 | 9 | 11 | 2 | 6 | 2 | 20 | 12 | 21 | 2 |
| Monocytes ... | | 5 | 5 | 3 | 7 | 13 | 6 | 6 | 7 | 10 | 6 | 4 |
| Eosinophils ... | | 2 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 2 |
| Basophils ... | | 0 | 2 | 0 | 0 | 1 | 0 | 0 | 1 | 2 | 2 | 0 |
| Haemoglobin ... | | 13·2 | 13·6 | 14·1 | 13·0 | 11·7 | 12·4 | 11·3 | 12·8 | 11·7 | 12·0 | 12·4 |
| *Sheep No.* 126 | | | | | | | | | | | | |
| White cells × $10^3$ | | 6·8 | 7·2 | 12·4 | 5·2 | 8·2 | 6·8 | 5·4 | 6·1 | 7·4 | 7·6 | 4·7 |
| Bands ... ... | | 5 | 5 | 6 | 2 | 0 | 0 | 0 | 2 | 0 | 0 | 0 |
| Polymorphs ... | | 18 | 12 | 65 | 44 | 51 | 26 | 41 | 52 | 47 | 50 | 48 |
| Lymphocytes ... | | 56 | 69 | 19 | 46 | 39 | 66 | 50 | 34 | 40 | 37 | 38 |
| Large lymphocytes | | 15 | 9 | 2 | 4 | 1 | 4 | 5 | 8 | 3 | 6 | 4 |
| Monocytes ... | | 5 | 3 | 8 | 3 | 5 | 4 | 4 | 4 | 8 | 4 | 4 |
| Eosinophils ... | | 1 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 2 | 3 | 6 |
| Basophils ... | | 0 | 2 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Haemoglobin ... | | 12·1 | 11·6 | 11·3 | 10·0 | 10·6 | 10·2 | 9·8 | 10·5 | 11·4 | 11·4 | 10·1 |
| *Sheep No.* 127 | | | | | | | | | | | | |
| White cells × $10^3$ | | 11·0 | 12·0 | 11·4 | 9·0 | 6·6 | 7·4 | 10·6 | 8·9 | 5·3 | 8·8 | 10·1 |
| Bands ... ... | | 5 | 2 | 2 | 1 | 4 | 0 | 0 | 2 | 0 | 0 | 0 |
| Polymorphs ... | | 14 | 23 | 63 | 50 | 21 | 39 | 37 | 47 | 36 | 23 | 27 |
| Lymphocytes ... | | 53 | 60 | 21 | 32 | 62 | 48 | 51 | 40 | 41 | 48 | 52 |
| Large lymphocytes | | 15 | 13 | 9 | 12 | 5 | 10 | 8 | 5 | 11 | 10 | 6 |
| Monocytes ... | | 9 | 2 | 5 | 5 | 5 | 2 | 3 | 3 | 7 | 9 | 10 |
| Eosinophils ... | | 3 | 0 | 0 | 0 | 3 | 1 | 1 | 3 | 5 | 9 | 5 |
| Basophils ... | | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Haemoglobin ... | | 12·5 | 12·4 | 12·4 | 13·2 | 11·4 | 12·6 | 11·2 | 13·0 | 12·2 | 12·5 | 11·8 |

previous to the inoculation of staphylococci. In this group a transient neutrophilia was, however, caused by the secondary injection of staphylococci.

Following the neutrophilia in both groups there was a period of marked neutropenia. This, in the case of the uncomplicated tick-borne fever infection, was succeeded by a neutrophilia.

In the case of tick-borne fever there was a decrease in lymphocytes over a short period beginning four days after inoculation. When the staphylococci were also present this decrease in lymphocytes was much more marked and was persistent.

In the case of sheep No. 124, which received both inocula, the sepsis due to the inoculation with staphylococci appeared to have produced a secondary haemorrhage, giving rise to a large diffluent swelling that contained a large proportion of blood. Films from this sheep were exceptional in that from the fourteenth day after the first inoculation there was a marked shift to the left in the neutrophil cells while anaemic changes were apparent in the blood smears.

The distinctive feature of the tick-borne fever reaction was the leucopenia, or more particularly the neutropenia, that was produced by the infection.

This leucopenia would appear to be due to an aplasia and not to marrow exhaustion in that a neutrophilia could be stimulated by the injection of staphylococci.

## GENERAL CHANGES AND DISCUSSION

From an examination of these blood pictures it would seem that the reactions resulting from the various inocula employed all tend to conform to a common pattern, the differing results varying more in degree than in character.

The changes in the absolute numbers of neutrophils were most apparent in the case of sheep inoculated with staphylococci. The reaction took the form of a neutrophilia that regressed and was later followed by a second, and more prolonged, neutrophilia. In the case of louping-ill the same series of changes was apparent in a less degree and for a shorter duration. In the case of the tick-borne fever group the period of regression was so exaggerated as to give a marked neutropenia, but this was, as in the other cases, both preceded and succeeded by a neutrophilia. It has been pointed out that not all sheep of the tick-borne fever groups gave evidence of the post-inoculation neutrophilia; this does not, however, exclude the possibility of a neutrophilia having occurred previous to the second day after inoculation.

In no group was there a marked shift to the left in the neutrophil cells. This was unexpected in the case of the animals inoculated with staphylococci, especially in view of the temperature reaction and the abscess formation that occurred. We have, however, some indication that this shift to the left is also absent in some natural cases of staphylococcal infection. Evidence on this point was obtained from blood films from two lambs affected with joint-ill. *Staphylococcus aureus* was obtained from the joint lesions but neither case showed regenerative changes.

With regard to individual sheep, one animal, No. 124, showed a marked shift to the left. This sheep had received both tick-borne fever and staphylococci and, as previously noted, appeared to have suffered a secondary haemorrhage at the site of inoculation. Here the band forms were present up to as much as 29 per cent. of the total count.

The reaction of the eosinophil cells (Fig. 2) was essentially the same in all groups. These cells disappeared from the blood a few days after infection and recurred in markedly increased numbers with the commencement of recovery. This eosinophilia was not, however, always concomitant with the second stage of neutrophilia. The basophils, owing to the smallness of their numbers, were more random in occurrence but they appeared to follow the same lines as the eosinophils.

The monocytes (Fig. 3) were irregular in all groups, showing temporary increases, or defence periods. The lymphocytes (Fig. 1) appeared to play a passive part except in the presence of staphylococcal infection, in which case there was a decrease in numbers over a fairly long period.

The results showed that in every group there was a decrease in large lymphocytes (Fig. 3) following inoculation. There did not appear to be any correlation between this decrease and the total lymphocyte count or the monocyte count. The significance of this decrease in large lymphocytes is unknown but the fact of its occurrence appears worthy of record.

In all groups there was a small but progressive diminution of haemoglobin. This was not accompanied by any anaemic changes in the blood cells, except in the case of sheep No. 124, already referred to. It is thought probable that this decrease is not the result of increased destruction but is due to the inhibition in haemoglobin production owing to the presence of an inflammatory process, as demonstrated by Robscheit-Robbins and Whipple (1936).

### Summary and Conclusions

The results showed that each infection produced a similar series of changes in the blood picture. From this common pattern staphylococcal infection was differentiated by a transient but marked neutrophilia following inoculation, together with a prolonged decrease in lymphocytes, while tick-borne fever was characterised by a period of neutropenia.

In view of the large variation in individual blood films and individual sheep, together with the variations in each infection due to the different phases through which the reaction passed, it would appear that the blood picture is of no practical value as a means of differential diagnosis between the infections produced.

With the exception of one animal, there was no definite regenerative shift in the neutrophilic leucocytes, while in all groups a decrease in the proportion of large lymphocytes following inoculation was noted.

*Acknowledgment.*—We wish to express our thanks to the Director of this Institute, Dr. J. Russell Greig, for his interest in this work.

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## CLINICAL COMMUNICATION

### Calculus of the Bladder in a Kitten

R. C. G. HANCOCK, B.SC. (LOND.), M.R.C.V.S.
BEACONSFIELD

I record this case in view of the age of the subject, a black male kitten, eight weeks old. Between the sixth and seventh week the owner noticed frequent micturition of small quantities of urine. The local quack diagnosed cystitis, and a further consultation with a veterinary surgeon led to a diagnosis of gravel.

A large stone was palpated in the bladder. The kitten was destroyed. The carcase weighed 2 lb. The bladder walls were nearly ¼ inch thick and the interior was practically filled by the stone, a cream coloured pyramidal, pitted, hard calculus, ¼ inch by ¼ inch at its base and 5/16th inch high, weighing 5 grains.

I have met with calculus in puppies. Twenty years ago, Sir Frederick Hobday, in *The Veterinary Journal*, recorded a case in a spaniel puppy which I sent to him for operation. I have not previously met with such a case in cats.

## ABSTRACTS

**[OBSERVATIONS ON PARTURIENT PARESIS AND RELATED CONDITIONS.** MORIN, L. N. (1941.) *N. Amer. Vet.* **21**. 465-470. (2 tables.).]

The article outlines briefly the progress made in the treatment of milk fever and allied conditions by calcium therapy, and the observations are the result of ten years' clinical work. In the earlier years the author used calcium chloride 10 per cent. and 20 per cent. solution in doses of 150 to 250 c.c. intravenously. Treatment was only partially successful, and calcium gluconate was substituted for the chloride with less harmful results.

Later, the study of ketosis (acetonaemia) led him to test for ketone bodies in the urine, and when these were present a 50 per cent. dextrose solution was added to the intravenous injection. At the present time the standard injection consists of 250 c.c. 23 per cent. calcium gluconate plus 250 c.c. 50 per cent. dextrose, whether or not ketones are present. The technique of administering large doses intravenously is explained. The application of a tourniquet has been discontinued and the animal's head is now left partially relaxed. The gravity method is used and the solution, at body temperature, is injected slowly.

Sudden deaths have taken place during the injection, and these are ascribed to thrombosis following a too sudden "boosting" of the heart action. Other patients developed pneumonia and some have shown an apparent improvement only to drop down dead. The latter cases are believed to be due to apoplexy. The possible relation of the length of gestation period and weather factors to milk fever is discussed without any conclusions being drawn. The author finds that milk fever is a disease of maturity, occurring at the third or later calving, with a large, full-time or overtime calf. Efforts at preventing the condition have not met with success. Prognosis depends on significant signs, *viz.*, trembling of muscles, lachrymation, bowel evacuation and, finally, on the animal rising to her feet. The aftercare is stressed, and the author insists that no milk be withdrawn for at least 24 hours and that patients receive glucose in some form where ketosis is present.

[NOTE.—The author believes it is safe to assert that the intravenous injection is one of the greatest boons to the clinician. The results obtained, however, scarcely warrant the supersession of the less spectacular subcutaneous method, having regard to the risks and difficulties of the intravenous route.]

C. D.

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**[NODULAR CASEATION AND TUBERCULOSIS OF THE SUBCUTIS OF CATTLE.** JÖHNK, M. (1940.) *Berl. Münch. tierärztl. Wschr.* March 15th. 121-126.]

Jöhnk reports the finding of "skin lesions" in cattle imported into Bremen from Ireland. Seventy-four cases were seen over a period of three years, 68 being Shorthorn oxen, the rest cows. No other breed of cattle was seen to be affected. Fourteen cases are described in detail: they resemble closely those described by other workers in North America and Sweden and in Great Britain and are due to infection by an acid-fast organism which has a low pathogenicity.

Two genuine cases of tuberculosis of the subcutis in Irish oxen are also described. They resembled exactly the cases of "skin lesion," only differing from them in that tubercle bacilli were isolated.

J. E.

* * * * *

**[DEMONSTRATION OF RABIES VIRUS NEUTRALISING ANTIBODIES IN DOGS FOLLOWING VACCINATION.** LYON, B. M., REDDIN, L., and WOODMAN, V. R. (1940.) *Vet. Med.* **35**. 310.]

Single and multiple doses of canine rabies vaccine, inactivated by phenol or chloroform, were shown to stimulate the production of viricidal antibodies in the serum of dogs.

H. H. S.

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**[DISTEMPER AND ENCEPHALITIS: DIFFERENTIAL DIAGNOSIS—A SHORT SUMMARY.** *Vet. Med.* **35**. 304.]

1. *Canine Distemper* is usually a virus disease of the dog, but the fox, raccoon, mink and ferret are highly susceptible and suffer epizootics both in the wild and in captivity. The disease in all animals is characterised by inclusion bodies, usually cytoplasmic but occasionally nuclear, in the epithelium of the respiratory and intestinal tracts, and in the linings of the bile ducts, kidney pelvis, and urinary bladder.

2. *Epizoötic Fox Encephalitis* is a virus disease usually of the red or silver fox, although dogs and wolves are readily susceptible. Clinically, the disease is strikingly similar to uncomplicated canine distemper except that the duration of symptoms rarely exceeds five days. It is characterised by inclusion bodies, always nuclear, in the endothelium of the smaller blood vessels and by similar inclusions in the hepatic cells of the liver cords.

3. *Ferret Distemper* is a virus disease due to a modification of the canine distemper or Carré's disease. It is characterised by the same inclusion bodies as those of canine distemper, since it is the same

virus. The ferret virus is non-pathogenic for foxes and dogs but highly fatal to mink, sometimes destroying all the animals on a mink ranch. The virus modified in ferrets has been termed canine distemperoid virus.

H. H. S.

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**[OBSERVATIONS ON BARTONELLOSIS IN DOGS IN INDIA.** Ray, H. N., and Idnani, J. A. (1940.) *Ind. J. Vet. Sci. and Anim. Husb.* **10**. 259-270.]

In the course of a brief summary of previous work on Bartonella, the authors state that *Bartonella bacilliformis* as regarded as being the cause of the two human diseases Oroya Fever and *Verruga peruana* in Peru, the latter being characterised by warty excrescences on the skin. Daniele Carrion, a Peruvian medical student, inoculated himself in 1885 with serum from a Verruga nodule, developed Oroya fever, and died in 39 days, so that his heroism has been enshrined in the alternative name Carrion's disease.

Organisms of the Bartonella type, taking the shapes of minute rods, rings, dumb-bells and so on, are found in the erythrocytes and endothelial cells of the viscera and are associated with fever and often fatal anaemia. They have been recorded in various animals, including man, the rat, mouse, guinea-pig, ant-eater, opossum, squirrel, dog, some bovines, the pike (*Esox lucius*), the lamprey and the frog. Much of the experimental work has been done with *Bartonella muris* of rats and *Bartonella canis* of dogs. The relative frequency of the infection in dogs from which the spleen had been removed led Kikuth to suggest that removal of the spleen damaged the reticulo-endothelial system, which exerted a protective action against the parasite.

Ray and Idnani studied the disease and the parasite in pariah dogs, in which a strain of *Bartonella canis* has been maintained by them since 1934, when it was found in a dog which died 15 days after it had been inoculated with *Babesia gibsoni*, a protozoon which, by itself, usually runs a chronic course in pariah dogs with a mortality of 20 to 30 per cent. The authors separated the two parasites by taking advantage of their previous experience that the incubation period of *Babesia gibsoni* is longer when it is introduced subcutaneously than when it is inoculated intravenously. They inoculated pariah dogs subcutaneously with dog's blood containing both parasites and recovered *Bartonella canis* from the peripheral blood (where it appeared within a week) before the appearance there of *Babesia gibsoni* (which did not appear in the peripheral blood after subcutaneous inoculation for 20 days or so, although after intravenous inoculation it appeared in one of their dogs by the seventh day). This ingenious procedure enabled the authors to maintain a pure strain of *Bartonella canis* through several passages in pariah dogs, although the appearance of *Babesia canis* " interfered from time to time. . . ."

The morphology of *Bartonella canis* is described and illustrated in a coloured plate of the parasites as they appear in blood films stained with Giemsa. The authors conclude that the coccoid forms are the first to appear, either on the surface of or inside the erythrocytes, measuring 0·5 microns or rather less in diameter. Each of these elongates and divides into two by constriction, so that chains of 4 to 12 or more coccoid forms appear, some of which show a ring phase with a very prominent chromatinic dot at one end of the ring. Chains of coccoids may take the ring form with the largest ring in the centre and the smallest at the ends, these chains corresponding to Kikuth's " violin-bow " forms. The rings may separate and divide, the chromatinic dot being elongated and the ring constricting to divide into two coccoids. In acute cases the coccoids and bacillary forms may appear in the plasma. Parasitised corpuscles appear to adhere together in groups. The parasites were found in smears made from " the various internal organs " as well as in smears of peripheral blood, but they were never found in smears from the spleen, although the spleen was usually enlarged.

The symptoms in dogs infected with *Bartonella canis* were high fever (105° F. or more), staring coat, dry nose, constipation followed by diarrhoea with yellow offensively smelling stools, pale mucosae, eye and nose discharge, high-coloured urine and progressive loss of appetite with a tendency to lick the earth and to fill the stomach with foreign matter. Marked anaemia is pathognomonic and frequently there is panting for breath, apparently due to the very heavy destruction of erythrocytes and consequent deficient oxygenation. Severe cases end in a fall of temperature by crisis to below the normal level and coma for two days or so before death.

The authors found the range of the normal red blood cell count to be 6 to 8 million per c.mm., but in dogs with bartonellosis it fell to 1·5-2·5 million per c.mm. and was in one dog only 80,000 per c.mm. on the day of death, the Sahli haemoglobin reading on this dog being then only 15. The Sahli haemoglobin readings on normal dogs averaged 60, but in dogs with bartonellosis they were only 30 or 25, the blood showing retarded coagulation. Blood films showed achromasia, anisocytosis, poikilocytosis and basophilia, nucleated red cells being common. The reduction of the numbers of erythrocytes gave the appearance of a preponderance of white cells.

After death the carcase was " almost literally a bag of bones." There was jaundice everywhere, the liver and spleen were enlarged, jaundiced and petechiated, the spleen pulp being very soft and almost jelly-like, with white specks in the parenchyma; the kidneys were sometimes enlarged with petechiated surfaces; the intestines sometimes showed patchy submucous haemorrhages; the lungs were pale and sometimes emphysematous; but the heart often showed nothing but ecchymoses.

G. L.

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Weekly Wisdom

*It was his opinion that the man whose daily business led him through familiar tracts in a forest did well to stray from time to time into the shady depths that lie on either hand. By so doing his imagination was opened; he learnt his own limitations and perhaps might gain some clearing on a hill-top which commanded a wider view than he had ever had before.*—The Life of Sir Alfred Ewing, by R. W. Ewing.

* * * * *

**According to Mr. S. J. Rowland, of the National Institute for Research in Dairying, investigations covering bombing incidents over a wide area of the southern half of the country show that there is no evidence that air raids on or near dairy herds exert any effect on the composition quality of the milk produced.**

## REPORT

[**Fiji :** Annual Report. (1940.) Veterinary Division, Department of Agriculture.]

This report, as received, is titled " Summary of the Annual Report, 1940," and is signed by the Senior Veterinary Officer, Mr. C. R. Turbet, M.R.C.V.S.

The livestock census is given as 14,000 horses, 75,000 cattle, 480 sheep, 26,000 goats and 4,500 pigs, but it appears that poultry also form part of the colony's assets, and the Department is particularly anxious to increase poultry production.

The Veterinary Staff is not given and its duties are stated to include disease suppression under the Contagious Diseases Ordinance, animal husbandry, pasture improvement, inspections at ports and hospital treatment of animals. The contagious diseases mentioned as being present are tuberculosis at an incidence of 6·7 per cent. on 1918 tuberculin tests which were conducted, contagious abortion which is enzootic in a few areas, actinomycosis, parasitism (presumably helminthiasis), bacillary white diarrhoea, fowl pox and infectious coryza of fowl and canine distemper.

On the husbandry side, pig, as well as poultry production is receiving particular attention. Sheep production is languishing, while goat breeding is increasing. In spite of increased demand for beef, local production was able to supply the amount required. The animals slaughtered for food were 6,500 cattle, 2,000 pigs, 400 sheep and 4,000 goats.

W. K.

## NOTES AND NEWS

The Editor will be glad to receive items of professional interest for inclusion in these columns.

### Diary of Events

June 18th.—Meeting of the Ayrshire Division, N.V.M.A., at Ayr, 2.30 p.m.
June 19th.—Meeting of the N.V.M.A. Finance and General Purposes Committee, Royal Station Hotel, York, 2.30 p.m.
June 19th.—R.C.V.S. Committee Meetings, Royal Station Hotel, York.
June 20th.—R.C.V.S. Annual General Meeting, Royal Station Hotel, York, 12 noon.
June 20th.—R.C.V.S. Committee and Council Meetings, Royal Station Hotel, York.
June 20th.—Victoria Veterinary Benevolent Fund Annual General Meeting, Royal Station Hotel, York, 12.30 p.m.
June 25th.—Meeting of Scottish Metropolitan Division, N.V.M.A., at Moredun, 2.30 p.m.
June 26th.—Meeting of the South-Eastern Division, N.V.M.A., at Maidstone, 2.30 p.m.
June 26th.—Meeting of the Lincolnshire and District Division, N.V.M.A., at Peterborough, 2.30 p.m.
June 26th.—R.C.V.S. Written Examination begins.
June 30th.—R.C.V.S. Oral and Practical Examination begins.

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### Control of Diseases of Dairy Stock

At the special meeting of Council held at York on Friday of last week, details of the provisional agreement arranged by the Association's representatives with the National Farmers' Union were approved, subject to the alteration of one detail. Details of this agreement will be sent round to the secretaries of the Divisions at an early date for the purpose of discussion at local meetings; it is hoped that every Division will arrange a meeting for its consideration, and for that of the implementation of the schemes for the control of the diseases of dairy stock.

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### R.C.V.S. OBITUARY

Johnson, Edgar David, O.B.E., T.D., Col. late A.V.S. (T.A.), of The Paddocks, Hurst, Berkshire. Graduated London, May 17th, 1889. Died May 25th, 1941.

Colonel Johnson practised for many years at 45, St. James Street, Nottingham. He had been veterinary officer to the South Notts Hussars, and about ten years ago sold his business to Major P. M. Evershed. He resided at Edwalton, but shortly after his retirement went to live in Berkshire.

* * * * *

### BENEVOLENCE

Further Donations Received in Response to the Appeal made by the Officers of the N.V.M.A.

| | £ | s. | d. |
|---|---|---|---|
| Already acknowledged ... ... ... ... | 850 | 14 | 6 |
| The sum of £12 5s. received from the Scottish Metropolitan Division and included in the above total was subscribed by :— | | | |
| Cowie, A. J., Edinburgh ... | 0 | 5 | 0 |
| Downie, H. F., Falkirk ... | 2 | 2 | 0 |
| Gibson, J., Dundee ... | 0 | 10 | 0 |
| Gordon, Dr. W. S., Gilmerton | 0 | 10 | 6 |
| Linton, Prof. R. G., Edinburgh | 0 | 10 | 0 |
| Player, J. F., Edinburgh ... | 5 | 5 | 0 |
| Robertson, Dr. A., Edinburgh | 0 | 5 | 0 |
| Sillars, A., Stirling ... ... | 1 | 1 | 0 |
| Spreull, Dr. J., Dundee ... | 1 | 1 | 0 |
| Watts, Dr. P. S., Ayr ... | 0 | 10 | 6 |
| Wilson, H. M., Cupar ... | 0 | 5 | 0 |
| Ormrod, A. N. ... ... ... ... ... | 2 | 0 | 0 |
| Gordon, A. G. ... ... ... ... ... | 0 | 10 | 0 |
| Kraft, Miss I. ... ... ... ... ... | 0 | 5 | 0 |
| *Per Mid-West Division* :— | | | |
| Auld, Wm. C. ... ... | 2 | 2 | 0 |
| Austin, Capt. A. W. ... | 1 | 1 | 0 |
| Baird, M. ... ... ... | 2 | 2 | 0 |
| Baxter, A. J. ... ... | 1 | 0 | 0 |
| Baxter, J. R. ... ... | 1 | 0 | 0 |
| Brain, T. J. ... ... ... | 1 | 1 | 0 |
| Britten, A. F. F. ... ... | 0 | 10 | 0 |
| Brown, Esmond ... ... | 1 | 1 | 0 |
| Brownlie, W. M. ... ... | 1 | 0 | 0 |
| Gachet, A. E. ... ... | 1 | 0 | 0 |
| Golledge, C. R. ... ... | 3 | 3 | 0 |
| Golledge, L. St. Bel ... | 2 | 2 | 0 |
| Golledge, S. V. ... ... | 2 | 0 | 0 |
| Gould, G. N. ... ... | 2 | 2 | 0 |
| Hardy, F. B. ... ... | 1 | 1 | 0 |
| Hartley, W. ... ... ... | 1 | 0 | 0 |
| Henson, Lt.-Col. ... ... | 1 | 1 | 0 |
| Margarson, T. J. ... ... | 2 | 0 | 0 |
| McCutcheon, Capt. A. J. ... | 1 | 0 | 0 |
| McDowell, A. O. ... ... | 1 | 1 | 0 |
| Menzies, D. W. ... ... | 1 | 1 | 0 |
| Nicholson, D. S. S. ... | 1 | 7 | 6 |
| Perry, C. E. ... ... ... | 1 | 1 | 0 |
| Pettifer, S. H. ... ... | 1 | 0 | 0 |
| Powell, J. C. S. ... ... | 1 | 0 | 0 |
| Pugh, C. J. ... ... ... | 1 | 0 | 0 |
| Rees, W. D. ... ... | 2 | 2 | 0 |
| Reynolds, T. J. ... ... | 1 | 1 | 0 |
| Scott, Dr. Wm. ... ... | 1 | 0 | 0 |
| Steele-Bodger, H. W. ... | 1 | 0 | 0 |
| Stephens, T. K. ... ... | 1 | 0 | 0 |
| Stewart, J. H. ... ... | 2 | 2 | 0 |

| | £ | s. | d. | | | |
|---|---|---|---|---|---|---|
| Strachan, C. G. ... ... | 1 | 0 | 0 | | | |
| Thorburn, E. J. and Wilkins H. C. ... ... ... | 5 | 5 | 0 | | | |
| Tweed, W. ... ... ... | 1 | 0 | 0 | | | |
| Watkins, C. D. ... ... | 1 | 1 | 0 | | | |
| Watson, W. J. B. ... ... | 1 | 1 | 0 | | | |
| Williams, R. E. ... ... | 1 | 0 | 0 | | | |
| | | | | 53 | 8 | 6 |

*Per Lancashire Division (third contribution)—*

| | £ | s. | d. | | | |
|---|---|---|---|---|---|---|
| Anderson, T. S. ... ... | 0 | 10 | 0 | | | |
| Clark, E. ... ... ... | 0 | 2 | 6 | | | |
| Clunie, R. N. ... ... | 1 | 1 | 0 | | | |
| Corrigall, E. R. ... ... | 0 | 2 | 6 | | | |
| Greenhalgh, R. L. ... ... | 1 | 1 | 0 | | | |
| Hay, T. E. ... ... ... | 1 | 1 | 0 | | | |
| Marginson, G. C. ... ... | 5 | 5 | 0 | | | |
| Marginson, J. C. ... ... | 1 | 1 | 0 | | | |
| Ratter, A. ... ... ... | 2 | 2 | 0 | | | |
| Small, J. ... ... ... | 0 | 2 | 6 | | | |
| Simons, G. ... ... ... | 1 | 1 | 0 | | | |
| | | | | 13 | 9 | 6 |

*Per Northern Area of Association of Veterinary Inspectors, Ministry of Agriculture and Fisheries—*

| | £ | s. | d. | | | |
|---|---|---|---|---|---|---|
| Beattie, G. S. ... ... | 0 | 10 | 0 | | | |
| Boyle, V. ... ... ... | 0 | 10 | 0 | | | |
| Callender, E. R. ... ... | 0 | 10 | 0 | | | |
| Corrigall, E. R. ... ... | 0 | 10 | 0 | | | |
| Coward, G. D. ... ... | 0 | 10 | 0 | | | |
| Clark, E. ... ... ... | 0 | 10 | 0 | | | |
| Davidson, J. C. ... ... | 0 | 10 | 0 | | | |
| Dunn, P. D. ... ... | 0 | 10 | 0 | | | |
| Grant, A. M. ... ... | 0 | 10 | 0 | | | |
| Halford, R. L. P. ... ... | 0 | 5 | 0 | | | |
| Hamilton, A. A. ... ... | 0 | 10 | 0 | | | |
| Jordan, J. ... ... ... | 0 | 10 | 0 | | | |
| Stinson, O. ... ... ... | 0 | 10 | 0 | | | |
| Massey, G. T. ... ... | 0 | 10 | 0 | | | |
| Massey, R. T. H. ... ... | 0 | 10 | 0 | | | |
| Morris, E. G. ... ... | 0 | 10 | 0 | | | |
| Randle, C. S. ... ... | 0 | 10 | 0 | | | |
| Ritchie, J. N. ... ... | 0 | 10 | 0 | | | |
| Small, J. ... ... ... | 0 | 10 | 0 | | | |
| Stinson, O. ... ... ... | 0 | 10 | 0 | | | |
| Varley, E. ... ... ... | 0 | 5 | 0 | | | |
| Walker, P. W. ... ... | 0 | 10 | 0 | | | |
| | | | | 10 | 0 | 0 |
| West of Scotland Division ... ... ... | | | | 10 | 10 | 0 |
| North of England Division ... ... ... | | | | 21 | 14 | 0 |
| **Total to date** ... ... | | | | 962 | 11 | 6 |

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## "WEEDING OUT THE WASTERS"

### Self-supporting Farms

Under the first heading, the Agricultural Departments of Great Britain and the Ministry of Food, in a joint announcement, say: Supplies of imported feeding stuffs next winter will be very short—so short, in fact, that every milk and beef producer must aim at making his farm self-supporting, either by the growing of fodder crops, or by making plans for converting aftermath and roughage into silage. There will be a certain quantity of by-products from wheat, and a limited tonnage of cake from imported oil seeds. But these must be regarded as "bonuses."

It is for this reason that Mr. Hudson, the Minister of Agriculture, impresses on every farmer the vital need for making his farm self-contained. With this in mind the Minister urges that every inferior animal should be culled—not in the autumn, but at once. No animal incapable of showing an adequate return for its keep must be retained. Livestock production is to be planned as crop production has been planned. The ploughing-up policy has been administered to make the best use of our land resources. Livestock policy so framed will make the best use of our feeding resources. County War Agricultural Executive Committees in England and Wales are to be given powers to supervise the stocking of farms in the interests of good husbandry. They will see that inferior, unthrifty and diseased animals and poor yielders are culled.

[In connection with this important provision our readers will recall that in the course of his letter to *The Farmers' Weekly* of April 4th, reproduced in our issue of April 12th, Mr. Steele-Bodger, President N.V.M.A., urged the necessity for such a step, in the interest of good *animal* husbandry, as an essential accompaniment of the measures taken by the County War Agricultural Executive Committees for the enforcement of good *land* husbandry.—*Editor.*]

A return will shortly be called for of the farmer's intentions as to the culling of his cattle this summer. Representatives of County Executive Committees will visit farms in the next two months and give advice and assistance. Where necessary, compulsory directions will be served; but it is expected that in most cases farmers will themselves realise the need for disposing of unprofitable or diseased beasts.

Unthrifty beasts should be sent for slaughter now. As an inducement the Ministry of Food is instituting from June 9th until the end of October special new grades for cattle with low killing-out percentages, that would formerly have been purchased only as rejects. The Ministry of Food will purchase pregnant cows for slaughter; but in future a deduction of ½ cwt. will be made from the live weight in calculating the price payable for pregnant animals.

In Scotland a similar review of all herds will be directed by the Department of Agriculture for Scotland in consultation with the Agricultural Executive Committees and advised by expert visiting panels.

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In relation to the above announcement of a new scale of slaughter prices for low-grade cattle, *The Times* observes that this "marks a further development in war-time agricultural policy. Prospective supplies of imported feeding-stuffs are short for next winter, and all the supplies of imported and home-grown feeding-stuffs will be needed for the cattle which are capable of giving a full return in output of milk or beef. There will be nothing to spare for passengers, and the Government have rightly decided that the nation's herds should be culled now, well before the winter, and the numbers reduced to obtain the most economical results from the fodder that farmers will have. Mr. Hudson has said that the livestock production of the country is to be planned in the same way that crop production has been planned. This is a difficult undertaking for the space of a few weeks. But if farmers were to wait until the autumn to reduce their herds there would be a shortage of meat now, and then such a glut in the autumn markets that, as last autumn, the Ministry of Food would not be able to take all the beasts offered.

"A dairy farmer who discards one or two more low-yielding cows than usual may well find that his herd of fewer, but properly fed, cows is giving at least as much milk as before. There are some store cattle destined for beef which are of poor type or unthrifty, and are not worth finishing in present conditions. Such animals are better out of the way, and the Ministry of Food will buy them at 50s. per live hundredweight this month. Even so, some farmers may be reluctant to cull their herds, and in the next few weeks representatives of the War Agricultural Committees will visit farms to give advice and assistance. Where necessary, compulsory directions will be served; but this course is not likely to be required in many cases. Farmers realise by this time that their practice must conform to national policy and they are giving ready co-operation in all the developments of the food production campaign."

## FOOT-AND-MOUTH DISEASE IN EIRE

### Minister Condemns Obstructionists

During a recent debate on foot-and-mouth disease, in the Dail, Dr. James Ryan, Minister for Agriculture, said that while the majority of farmers were helpful, others were the reverse—the Minister mentioned a farm where veterinary inspectors of the Department of Agriculture were met with pitchforks and told not to come in. In Dublin they did not get full co-operation from some dairymen, but this was not deliberate. It was due principally to carelessness, and the fact that people did not seem to realise the seriousness of the position. There had also been an absence of co-operation among a small section of farmers in the Tullaroan and Kilmanagh districts of Kilkenny.

In many cases, of course, inspectors did not get all the information they required. Farmers were hesitant in answering questions as to where they or their families had been in a certain period. If there had been more candid answering the Department would probably have been able to prevent the spread of the disease more successfully. In no case had the disease spread from a farm after the veterinary inspectors got there and took the necessary precautions. "The day or two before the disease is notified—and indeed before the farmer himself may know that his stock has it—is the time when the spreading takes place," he said.

Mr. C. Fagan said it was unfair to blame the farmer entirely for the spread of the pest. The farmers directly concerned were doing their best to stamp out the disease. It was possible for the disease to be undetected for a day or two.

Mr. M. O'Reilly said that after many months of disappointment very extreme steps were now necessary to deal with the menace. Some endeavour must be made to organise definite methods of isolation.

### Improvement on this Side

While outbreaks continue in Eire, though happily on a reduced scale, the position in Northern England and Scotland is greatly improved at the time of writing. There have been no "suspicion" reports from any of the four counties of Scotland which were involved in the recent outbreaks, namely, Renfrew, Ayr, Dumfries and Lanark, indicating that the veterinary inspectors of the Ministry of Agriculture have been successful in controlling the situation.

The emergency which led to "control" of a wide area extending over the northern half of England and also over a triangle of Scotland from the Borders to the north-east corner of the Moray Firth coastline, appears to be receding, and it is not improbable that some modification of the controlled area will have been sanctioned by the time this note appears.

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## AGRICULTURAL FERTILISER PROGRAMME, 1941-42

The Government have decided to continue for the year beginning July 1st, 1941, the policy of stabilising prices of agricultural fertilisers. The decision to continue this arrangement for another year involves a substantial and increasing subsidy from the Exchequer to fertilisers in general, and in these circumstances, and in order to facilitate a reorganisation of distributive arrangements and to economise transport, the Government have decided to discontinue the special basic slag subsidy which has been in operation under the Land Fertility Scheme since 1937, and to utilise the money which would have been devoted to it together with the money involved in the price stabilisation policy for the benefit of phosphatic fertilisers generally.

This arrangement will have the effect of creating a more logical price structure for phosphatic fertilisers, and it will be possible as a result of it to secure some reduction in the price of superphosphate, particulars of which will be announced at an early date. In future the responsibility for the supply and distribution of basic slag will be assumed by the Fertiliser Control of the Ministry of Supply, acting as it does at present in close co-operation with the Agricultural Departments.

Subsidy payments on lime will be continued not only for the forthcoming year, but until the end of July, 1944. This assurance is designed to encourage producers of lime—particularly of ground limestone—to extend their plant. The Government are taking active steps to increase supplies in order that the needs of agriculture, as determined by the farmers themselves and by the County War Agricultural Executive Committees, are met. The administration of the lime subsidy will be closely linked up in future with this new work of development, work which cannot appropriately be brought within the scope of the existing Land Fertility Scheme. It is proposed, therefore, that the responsibility for the administration of the lime subsidy shall be undertaken directly by the agricultural Ministers as from August 1st next. Full use will be made of the administrative machine so efficiently developed for this purpose by the Land Fertility Committee, and the Government express their thanks to Lord Cranworth and his colleagues on the Committee for the valuable work they have done in their administration of a scheme which, under their guidance, has brought about a substantial improvement in the fertility of the soil in the past three years.

The distribution of superphosphate, basic slag and potash will be controlled in order to ensure the most efficient utilisation of supplies. The details of the scheme of control are under active consideration and will be announced shortly. As part of this scheme, County War Agricultural Executive Committees in England and Wales will continue to issue directions to farmers whose land is deficient in phosphates to apply suitable fertilisers, and action will be taken to ensure that supplies are held available to them for this purpose. The application of potash will be limited to specific crops such as potatoes and flax and at a maximum rate per acre, and before a farmer will be allowed to buy potash he will have to state in writing that it is for use on one or other of the priority crops. Special consideration will be given to soils which are particularly in need of potash, and in certain counties a reserve will be held, as was the case this season.

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## LEGAL NOTES

*Illicit Slaughtering: The "Black Market."*—At New Mills (Lancs), on June 4th, Robert Lofthouse, a cattle dealer, was sentenced to three months on each of three charges of slaughtering cattle for human consumption without a licence from the Ministry of Food, the sentences to run concurrently. He was also fined a total of £35 10s. and ordered to pay £4 13s. witnesses' expenses and £2 2s. advocate's fee on a number of other summonses, which included the causing of cruelty to cows by poleaxing them, using a slaughterhouse without licence, failing to notify the local authority of intention to slaughter a cow, and failing to notify the local authority that some part of a carcase was diseased. There were 20 summonses in all, four of which were withdrawn. Included in the total of fines was one of £10 for moving three pigs within a foot-and-mouth infected area.

Mr. G. F. Strange, prosecuting, said that meat produced in authorised slaughterhouses became controlled and rationed, but when people slaughtered without a licence there was no record of the meat. "This does take place," he said, "and the 'Black Market' becomes flooded with uncontrolled meat, which can be bought and sold without coupons, but at a high price."

Notice of appeal against the three convictions for slaughtering without a licence was given.

*Warble-fly Infestation.*—Sevenoaks magistrates recently fined Thomas Whiting, Pell's Farm, Kingsdown, farmer and horse dealer, £1, with 10s. 6d. costs, for failing to take measures prescribed for the destruction of a parasite with which a heifer was infested.

Defendant pleaded guilty, and evidence was given by Mr. J. W. Bruford, M.R.C.V.S., that he examined certain cattle at Sevenoaks Market, among them a Devon heifer which he found infested with live maggots of the warble-fly. He came to the conclusion that the animal had not been treated.

By the Chairman: Infection is quite obvious at this stage. The animal should have been dressed once a month from March until June.

Sergt. Castle said his attention was called to the animal by Mr. Bruford and he later saw defendant, who said "The beast was dressed last summer and has been in the yard since last September. I did not trouble to dress it as I was sending it to market."

Whiting said it was not neglect on his part: he had been so busy, and had had 60 acres of grain to get in. He had been on the farm 26 years and had never had any trouble before. The animals had been twice dressed since.

Pointing out that it was a serious matter to let these animals come to market, the chairman said that in view of what defendant had said there would be only a small penalty on this occasion.

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The Ministry of Food warns farmers that injury and damage may be caused by the presence of wild bulls and other wild cattle at collecting centres. They state that a farmer who wishes to sell for slaughter for human consumption an animal which is wild, should not send the animal to a collecting centre in the ordinary way, but should get in touch with the district chairman of auctioneers for the nearest centre. He will issue a consignment note authorising the animal to be consigned for slaughter direct to a Government slaughterhouse for grading and payment on the casualty basis.

## CORRESPONDENCE

Letters to the Editor should reach the Office not later than by the first post on Tuesday morning for insertion in following Saturday's issue.

Correspondents submitting letters for anonymous insertion must forward their names and addresses for the information of the Editor; otherwise their communications will not receive consideration.

*The views expressed in letters addressed to the Editor represent the personal view of the writer only and must not be taken as expressing the opinion or having received the approval of the N.V.M.A.*

* * * * *

### "A KEY POSITION IN AGRICULTURAL RESEARCH"

To the Editor of the Veterinary Record

Sir,—Evidently there must be something of extreme importance lacking on our part in the veterinary profession, otherwise a friend of ours, who is not a member, would not feel it his duty to come and guide us. We often hear nowadays through the B.B.C. that people should not be critical. On the contrary, as far as our profession is concerned, we should have more critics so that we may be awakened from our habit of indifference, otherwise we shall always "miss the 'bus."

I agree with parts of Dr. Crew's letter because I know only too well that we have, throughout the years, allowed outsiders to come in and act like the cuckoo, putting us out of our own nests. Take meat inspection as one example. Even laymen admit that its control should be in the hands of the veterinary profession as is the case in most up-to-date foreign countries. Again, medical officers of health have admitted that the veterinarian and not the medical man should have full control in this field. The writer has often called attention to this in the veterinary press, but so far his has been a voice crying in the wilderness. The only case which he has known of a veterinary surgeon being called to make a *post-mortem* examination on a human body was at Mexico when several revolutionists had to swing in the time of Pancho Villa. There was not a medical practitioner available, so the Government officials obliged the nearest veterinary surgeon to do the work. In the western hemisphere the veterinary profession is accorded its proper status. Indeed, in the country where I have dwelt for many years the veterinary surgeon was expected to have an encyclopaedic knowledge of all that pertained to animal husbandry as well as agricultural science.

The Bureau of Animal Industry of the U.S.A., which came into being 57 years ago, had as pioneers in its organisation several British veterinary surgeons such as Professor James Law, of Cornell University, who was entrusted with the work of stamping out pleuro-pneumonia in New York State. The Bureau's principal duties include the responsibilities of protecting the public health through meat inspection and other regulatory methods, investigating and promoting dairying, scientific research education, relieving animal suffering, promoting livestock industry, better methods of breeding, feeding and managing livestock, stimulating domestic commerce in animals and their products and preserving and extending export trade, etc, etc. In these matters the word of its chief is law. He, as well as his predecessors, did not possess medical degrees in addition to their veterinary qualifications. Veterinary surgeons have taken a leading part in developing our colonies and dominions. Mr. Gilruth, M.R.C.V.S., was for years the Administrator of the Northern Territories of Australia, although he did not hold a medical qualification. This does not support Dr. Crew's hypothesis that the veterinary surgeon should take a medical degree in order to open the doors of opportunity and master the complexities of specialisms. Pasteur was a chemist. Furthermore, most of his collaborators were veterinary surgeons. Indeed, one of them, Toussant, who discovered the germ of fowl cholera, had initiated the experiments on animals by inoculating them against anthrax. Griffith Evans, of tropical fame, was a veterinary surgeon in India when he discovered the first pathogenic trypanosome. A letter from Evans expresses his disappointment in not having the support of the British Government to carry on with his research work. Stockman was a veterinary surgeon without a medical degree, and was called home from abroad simply because it was considered that he was the most suitable person to be Chief Veterinary Officer to the Board of Agriculture in spite of one of its members possessing a university medical degree as well as being a member of the veterinary profession.

If Dr. Crew cares to glance over a few pages of the Register of the R.C.V.S. he will find that the majority of its pages contains numerous members with degrees in medicine, science, arts, philosophy, law, chemistry, agriculture, dentistry, etc., so proving that there is no scarcity of men with combined veterinary, medical and other qualifications.

Regarding the last paragraph of Dr. Crew's letter, may I refer him to a letter in *The Veterinary Record* of June 10th, 1939, p. 746, which might interest him.

Finally, why is it that we do not have our proper status, as do our colleagues in foreign countries, and indeed to a great extent in our dominions? The answer is obvious; many of our members are suffering from "inferiority complex" and prefer to be "Yes-men" to encroachers on our preserves who are anxious to rule our affairs and take our key positions, thus establishing a precedent which is prejudicial not only to the present but also to the future generation of veterinary surgeons.

Yours faithfully,

Edward Morgan.

"De Lejos,"
Crest Road,
Hayes, Kent.